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Instruction Manual

MICROMITE™

THERMO ELECTRIC

INSTRUCTION MANUAL

MICROMITE MICROPROCESSOR-BASED INDICATOR/CALIBRATOR & THERMOCOUPLE JUNCTION COMPENSATION MODULE & RTD MODULE

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1-0 DESCRIPTION

1-1 Introduction

This manual contains all the information normally required to operate and maintain the portable Micromite digital temperature indicator/calibrator. Always refer to the serial number and model number on the label attached to the case in correspondence or when ordering replacement parts, so that the unit can be properly identified.

Micromite is provided in several designs as listed in Section 1-5. Should you require additional information beyond what is contained in this manual, contact your local Thermo Electric Applications Engineer or our main office in Saddle Brook, New Jersey. For service information contact:

Thermo Electric Co., Inc.
109 Fifth Street
Saddle Brook, New Jersey 07662
Attn: Instrument Service Manager
Phone: 201-843-5800

1-2 Warranty

Thermo Electric Co., Inc. warrants Micromite to be free from all defects in material and workmanship for a period of two years, commencing on the date of shipment from Thermo Electric or one of our approved distributors.

The liability of the seller is limited to the repair or the replacement of the product only if failure occurs during the warranty period and factory inspection shows no external affects or customer repair altered the functioning of the instrument.

The instrument is to be returned to Thermo Electric or the nearest Thermo Electric authorized service center, freight prepaid, via the most economical service transportation methods after authorization by Thermo Electric. All charges for handling, reinstalling and miscellaneous expenses incurred will be the responsibility of the buyer. When factory examination show the returned instrument to be within the above warranty period, the

equipment will be repaired or replaced, at the seller's option at no charge to the buyer. This warranty shall be rendered null and void when, in the judgement of qualified Thermo Electric personnel, the equipment has been subject to abnormal or abusive use or lack of proper care or maintenance by the buyer, or when it has been determined that environmental conditions have exceeded those specified by Thermo Electric.

Any alteration or repair of the goods by the buyer or any party not authorized by Thermo Electric withour our specific consent, in writing, shall automatically terminate our warranty obligation.

This warranty on instruments manufactured and/or sold by Thermo Electric or on any service provided by us, is expressly in lieu of all other warranties, expressed or implied. No warranty is made of MERCHANTABILITY or fitness for any particular purpose.

No agent is authorized to assume liability for it or make any written or oral warranties or obligations beyond those set forth herein unless endorsed in writing and signed by an officer of Thermo Electric.

1-3 General Description

The Micromite is a highly accurate, compact and portable instrument which can be used to:

1. Measure temperature directly, using a thermocouple or RTD
2. Measure millivolt signals directly
3. Calibrate potentiometer type instruments
4. Calibrate laboratory instruments

Micromite is a portable single or dual calibration instrument with built-in reference junction compensation. The unit automatically displays the hot junction temperature of the attached thermocouple. Every standard thermocouple calibration is available in one range that covers the complete temperature span for that thermocouple as shown in the Calibration, Ranges & Accuracy Chart (See Section 1-4). In addition, millivolt and RTD ranges are offered as well. Resolutions offered are either 1 or .1 degree F or C or .01 millivolts.

Power required by Micromite is supplied by a rechargeable nickel cadmium battery pack. This battery pack can also be replaced in the field so that spare fully charged battery packs can be inserted eliminating the need for operating the unit with a recharger attached. This greatly improves the ability to use the unit in the field where power is not always readily available.

The battery recharger/AC adapter cord (115 VAC standard, 230 VAC optional) is included with the Micromite. It has a special 90° receptacle to differentiate from other rechargers. This also facilitates using the Micromite with the recharger attached, when it is set up on its own self-contained stand in a laboratory or office.

NOTE: Other rechargers may be plugged into the Micromite inadvertantly since the receptacle is a standard size. These rechargers may damage the unit, and will not recharge the unit. Therefore, recharge unit only with 115 VAC recharger provided (TE Part #A9257), and clearly identified as a Micromite recharger. For 230 VAC operation use recharger #A9380.

1-4 Micromite Specifications

Thermocouple Calibration	Temperature Range (Degrees)	Resolution (Degrees)	Overall Accuracy (Degrees)	Overall Accuracy (% of span)
J	-320 to 1675°F	0.1°F	+/-0.7°F	+/-.04%
		1.0°F	+/-1.0°F	+/-.05%
	-196 to 913°C	0.1°C	+/-0.4°C	+/-.04%
		1.0°C	+/-1.0°C	+/-.09%
K	-310 to 2500°F	0.1°F	+/-0.9°F	+/-.03%
		1.0°F	+/-1.0°F	+/-.04%
	-190 to 1371°C	0.1°C	+/-0.5°C	+/-.03%
		1.0°C	+/-1.0°C	+/-.06%
T	-320 to 750°F	0.1°F	+/-0.8°F	+/-.07%
		1.0°F	+/-1.0°F	+/-.09%
	-196 to 399°C	0.1°C	+/-0.4°C	+/-.07%
		1.0°C	+/-1.0°C	+/-.17%
E**	-320 to 1830°F	0.1°F	+/-0.9°F	+/-.04%
		1.0°F	+/-1.0°F	+/-.05%
	-196 to 999°C	0.1°C	+/-0.5°C	+/-.04%
		1.0°C	+/-1.0°C	+/-.08%
R	30 to 3200°F	0.1°F	+/-1.7°F	+/-.05%
		1.0°F	+/-2.0°F	+/-.06%
	-1 to 1760°C	0.1°C	+/-0.9°C	+/-.05%
		1.0°C	+/-1.0°C	+/-.06%

Thermocouple Calibration	Temperature Range (Degrees)	Resolution (Degrees)	Overall Accuracy (Degrees)	Overall Accuracy (% of span)
	30 to 3200°F	0.1°F	+/-1.7°F	+/-.05%
		1.0°F	+/-2.0°F	+/-.06%
S	-1 to 1760°C	0.1°C	+/-0.9°C	+/-.05%
		1.0°C	+/-1.0°C	+/-.06%
	1000 to 3200°F	0.1°F	+/-1.8°F	+/-.08%
		1.0°F	+/-2.0°F	+/-.09%
B	538 to 1760°C	0.1°C	+/-0.9°C	+/-.07%
		1.0°C	+/-1.0°C	+/-.08%
M***	-9.99 to 90.00mv	.01mv	+/-.01mv	+/-.01%
	-320 to 1500 °F	0.1°F	+/-0.7°F	+/-.04%
		1.0°F	+/-1.0°F	+/-.05%
RTD	-196 to 816°C	0.1°C	+/-0.4°C	+/-.04%
		1.0°C	+/-1.0°C	+/-.09%

*Accuracy figures for one degree Micromites are rounded up to the nearest degree.

**1450°F,788°C output limit on E calibration ranges

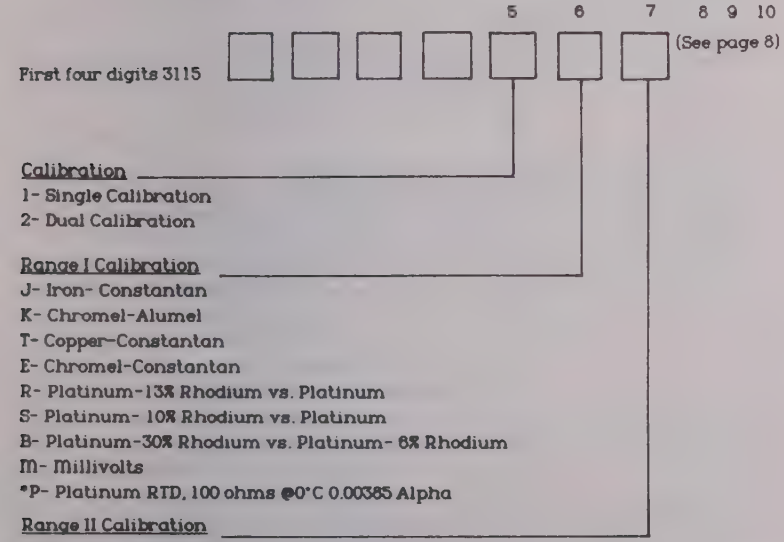
***60.00 mV output limit on millivolt ranges

Accuracies shown are based upon tests at 25°C

Accuracy and Conformity: See Figure 1-1
Resolution: 0.1°, 1.0°
Ambient Operating Temperature: 10°C to 55°C for J,K,T,E,B,M, Calibrations, -1°C to 55°C for R, S calibrations
Normal Mode Rejection: 50 db
Common Mode Rejection: 125 db (with recharger)
Input Leakage Current: 10 nanoamperes
Source Resistant Effects: 1 uV error/100 ohms source resistance
Measurement Time: 3 conversions/second for 4 conversions followed by 1 sec max RJC measurement
Input Impedance: 100 megohms minimum
Output Impedance: 50 ohms
Battery Pack Type: 4.8 V nom. 4 X 1.2 AHR SC Cell Nickel Cadmium Pack field replaceable
Battery Life: To 5 hours continuous or 600 temperature checks
Battery Recharger Time: 16 to 18 hours (overnight)
Temperature Stability: 76 PPM/°C of reading
Zero Drift: .13 uV/°F
Damaged Probe/Overrange or Underrange: Indicated by 'HI' or 'LO' respectivley
Weight: 33 ounces
Dimensions: 7 - 1/2 " H x 8 - 3/4 " W x 1 - 15/16 "D
Case: White die cast aluminum
Display: .33 inch LCD, 4 or 5 digits depending on resolution, automatic lealding zero suppression
Discharged Battery Display: 'HELP' all models
Recharger Voltage: 115 VAC, 50/60 HZ (230 VAC optional)
Cold Junction Compensation: Automatic .02 deg/deg J,K,T,E, .05 deg/deg R,S,B
Display Symbols: Automatically indicates °F, °C or mV depending on range selected
Source Mode Impedance: 50 ohms
Source Mode Output Range: -12 mV to 25 mV and 25 mV to 60 mV (J,K,T,E), -4.8 mV to 10 mV and 10 mV to 25 mV (R,S,B)
Storage Temperature: -50°C to +90°C for Micromite
-40°C to +60°C for maximum battery life

1-5 Description Code

The following identification table explains the instrument model number found on the Micromite.


5 6 7 8 9 10
(See page 8)
First four digits 3115
Calibration
1- Single Calibration
2- Dual Calibration
Range I Calibration
J- Iron- Constantan
K- Chromel-Alumel
T- Copper-Constantan
E- Chromel-Constantan
R- Platinum-13% Rhodium vs. Platinum
S- Platinum- 10% Rhodium vs. Platinum
B- Platinum-30% Rhodium vs. Platinum- 6% Rhodium
M- Millivolts
*P- Platinum RTD, 100 ohms @0°C 0.00385 Alpha
Range II Calibration
J- Iron- Constantan
K- Chromel- Alumel
T- Copper- Constantan
E- Chromel- Constantan
R- Platinum- 13% Rhodium vs. Platinum
S- Platinum- 10% Rhodium vs. Platinum
B- Platinum- 30% Rhodium vs. Platinum- 6% Rhodium
M- Millivolts
*P- Platinum RTD, 100 ohms @ 0°C, 0.00385 Alpha

* Requires RTD Input Module

Case

0- Standard carrying case included with the basic package.

1- Soft leather carry all case Model No. A9752 and standard carrying case

Standard Accessory Packages

0- Standard Micromite package includes Micromite, shoulder strap, carrying case, 115 VAC battery recharger and battery assembly.

1- Standard Micromite package (Option 0) plus battery pak recharger adapter (A9381), spare battery assembly, and two Micromite connectors (C028656).

2- Option 1 plus one J14G-304-0-8"-24"-1A, type J thermocouple with 304ss sheath, 8" overall length and 24" fiberglass insulated flexible leads.

3- Option 1 plus one K14G-1600-0-8"-24"-1A, type K thermocouple with Inconel 600 Sheath, 8" overall length and 24" fiberglass insulated flexible leads.

4-(For RTD Models Only) - Option 1 plus one RTD-14-HT-8"-24"-2A, 100 ohm @0°C platinum 3 wire RTD, 316ss sheath, 8" overall length and 24" flexible armored leads. RTD temperature range is -50°C to 500°C (-58°F to 932°F)

Resolution

0- 1° Resolution

1- 0.1° Resolution

Note: Specify -"C" suffix if report of Calibration Traceable to NBS is desired.

2-0 INSTALLATION

2-1 Unpacking

Unpack the instrument immediately upon receipt and check for shipping damages. If damaged, immediately report the damages to the carrier. Replace the instrument in its shipping container until ready to use. Sometimes, instruments are shipped with small accessory items in the same box. Check all items against the packing list before discarding the shipping container and packing material.

2-2 Location

The Micromite is a portable instrument which can also be used on tables or benches. It is readily transportated, but it should be kept in the protective carrying case whenever possible. It is operable over the ambient temperature limits of -10°C to 55°C for J,K,T,E,B, and M calibrations and -1°C to 55°C for R and S calibrations.

3-0 OPERATING INSTRUCTIONS

3-1 Thermocouple Wiring

The thermocouple input wires are attached to the input binding posts on the Micromite.

NOTE: Care must be exercised when connecting the thermocouple leads to ensure the correct polarity. If a shielded thermocouple is used, it is recommended that the shield be returned to the black (+) input terminal of the Micromite, along with the positive thermocouple lead.

3-2 Battery Charging

To charge the battery pack, insert the battery charger plug into the "RECHARGE" jack on the bottom of the Micromite and then plug the opposite end into the AC line. Use the 115 volt charger on 115 volts only. If only 220 volts is available, the optional charger should be used.

NOTE: Care must be exercised to ensure that the plug is firmly seated in the connector. The Micromite may be run with the battery charger connected. For maximum battery life, it is recommended that the unit be charged only when the discharged battery indication (display indicates HELP) is observed.

3-3 Battery Replacement

Place the Micromite face down on a clean, flat surface. Turn the locking screw on the bottom of the unit to release the self-enclosed bench stand. Raise the bench stand to expose Battery Replacement Instructions on the lower removable section of the rear cover. Loosen, without damaging the battery recharger receptacle, two (2) captive screws from this cover. Remove the cover, and turn it over carefully to expose the plastic battery compartment. Carefully unsnap the yellow battery pack from the plastic holder. Do not strain the connecting wires. Disconnect the polarized terminals on the red and black wires between the battery pack and the printed circuit board. Grasp the connecting terminals rather than pulling on the wires themselves.

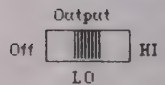
Snap the new battery pack into the plastic holder. Reconnect the red battery wire to the red lead from the printed circuit board and the black battery wire to the black lead. The terminal itself is polarized so that the wires can only be connected properly.

CAUTION: DO NOT allow the red and black leads from the battery to touch. This will result in a short which can melt the wires and permanently damage the battery pack.

Now, carefully tuck in the wires and reassemble the battery holder and metal cover, exercising care not to crimp or crush any of the wires under the cover. Tighten the two (2) screws on the cover. Fold down the bench stand and turn the locking screw to hold it in place. The Micromite is now ready to use. The removed battery pack can now be fully recharged out of the unit for subsequent use by using Thermo Electric 115 VAC mating adapter Part No. A9381.

3-4 Operating Controls, Micromite

The rear panel on the Micromite includes all the operating instructions to use the unit properly. Following are more detailed instructions. Always make sure first that the positive thermocouple leads are connected to the black terminal and the negative thermocouple leads to the red terminal



This switch selects whether the Micromite is used to indicate (read input mode) or calibrate (output mode) a thermocouple circuit. In the off position, the unit functions strictly as an indicator or reading instrument. This is the normal operating mode used to indicate temperature or millivolts. To output a signal, place the switch in either "LO" or "HI" for Lo and Hi span respectively. Details of each span may be found on the label on rear of the instrument. (Make sure that the selected span corresponds with the thermocouple calibration being used).

In the output mode ("LO" or "HI"), the black and red terminals are driven with a voltage that may be varied by turning this Adjust knob. When the output mode is used with a thermocouple range, the reference junction is functioning and a compensated millivolt equivalent of the display reading is available at the output terminals. When used with a millivolt range, the output voltage may be varied from -9.99 mV to +60.00 mV. The output voltage corresponds directly to the display reading. (Connecting a thermocouple to the terminals in the Output Mode will short out the source voltage defeating the operation of this mode). Clockwise rotation of knob increases the reading, while counterclockwise decreases the reading.

Place in the F or C position to both apply power to the Micromite and Select Fahrenheit or Celsius Scales. The millivolt range operates in either the F or C position. To conserve battery power, turn off the instrument when not in use.

On dual range models, select either Range I or II according to the range table on the rear of the instrument. At time of order we will indicate on this range table which calibration corresponds to each range.

A sample range table is reproduced here for reference.

Range Table

Range I	Range II		Total Span output span Lo		Hi
J		F	-320	855	1675
		C	-196	457	913
K		F	-310	1120	2500
		C	-190	604	1371
T		F	-320	750	750
		C	-196	399	399
E		F	-320	665	1450
		C	-196	352	788
R		F	30	1770	3200
		C	-1	966	1760
S		F	30	1900	3200
		C	-1	1083	1760
B		F	1000	2780	3200
		C	538	1527	1760
mV			-9.99	25.00	60.00
P		F	-320	N/A	1500
		C	-196		816

3-5 Temperature Measurement

Connect the thermocouple extension leads from the thermocouple to the Micromite terminal posts as outlined in Section 3-1. Make sure the output switch is in the *off* position. Place the power switch to F or C position for Fahrenheit or Celsius readings, and select Range I or II on dual calibration models corresponding to the thermocouple type being used. Read the thermocouple temperature on the display. Readout is in °F of °C as stated on the display of the instrument.

3-6 Millivolt Measurement (Millivolt Scale Models Only)

Connect the millivolt source to the Micromite terminal posts. Make sure the output switch is in the Off position. Place the power switch to F or C. Either position will read millivolts, in the millivolt range Select Range I or II, whichever corresponds to millivolts. The Micromite will now read the voltage, in millivolts, on the display. The display will also indicate mV.

3-7 Checking Potentiometer-Type Instruments with Thermocouple Input

To test or calibrate another instrument, connect the Micromite as shown in Figure 3-2, using thermocouple extension wire that matches the calibration of the instruments. Place the output switch to the "L" or "H" position corresponding to the desired span from the range table on the back of the instrument. Place the power switch to the F or C position for Fahrenheit or Celsius readings. On dual range units, place the range switch to I or II depending on the calibration used. Turn Micromite Output Adjust knob until the display indicates the desired temperature. The Micromite and the instrument being tested may be at different temperatures since reference junction compensation functions in this mode.

3-8 Checking Potentiometer-Type Instruments with Millivolt Input (Millivolt Scale Models Only)

To test or calibrate another instrument, connect the Micromite as shown in Figure 3-2 using copper lead wires. Place the output switch to the "LO" or "HI" position, corresponding to the desired millivolt span from the range table on the back of the instrument. Place the power switch to the F or C position. The millivolt range operates in either position. On dual range units, select Range I or II, corresponding to the millivolt scale on your instrument. Turn the Micromite Output Adjust Knob until the display indicates the desired millivolt value. Be sure the Micromite Indicator/ Calibrator is more accurate than the instrument to be calibrated. It is not necessary to maintain Micromite and the instrument being tested at the same ambient temperature since reference junction compensation functions in this mode.

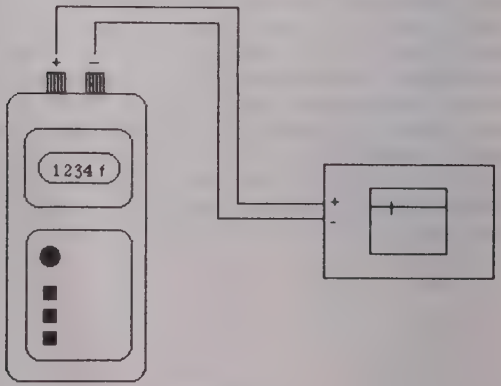


FIGURE 3-2

4-0 THEORY OF OPERATION

The Micromite microprocessor-based digital temperature indicator/calibrator with internal cold junction reference accepts the millivolt output of a thermocouple and provides a digital display of the equivalent temperature. To accomplish this, it contains the necessary circuitry to convert the input voltage to digital form and to display the result. As the voltage generated by the thermocouple is a nonlinear function of temperature, the microprocessor circuitry mathematically linearizes the input.

The measuring circuitry of the Micromite is shown in block diagram form in Figure 4-1. The circuitry includes the following elements:

4-1 Analog-Digital Converter

The converter will read either the voltage present at the terminals or the reference junction compensator depending on the state of switch S1. The information from the converter is then fed to the microprocessor and stored as Digital information.

4-2 Reference Junction Compensator

The compensator is a semiconductor temperature dependent current source which is thermally coupled to the input terminals. Its signal is fed to the Analog to Digital convertor when S1 is in the RJC position, giving a digital value equal to the terminal temperature which is then stored by the microprocessor.

4-3 Display Driver

The display driver receives digital information from the microprocessor and supplies the proper wave forms required to drive the liquid crystal display. The microprocessor provides the 4 or 5 digits required plus the legends °F, °C or mV.

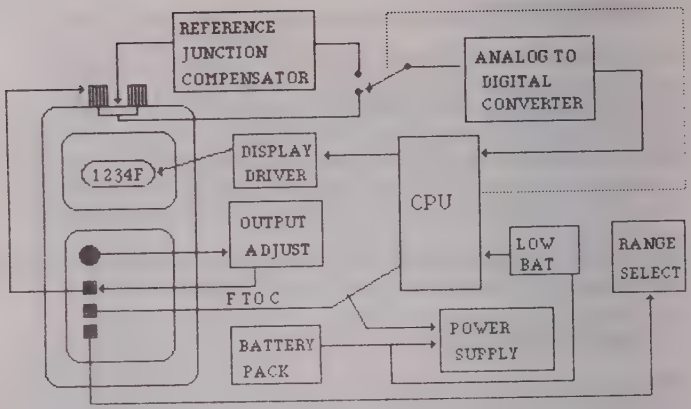


Figure 4-1

4-4 Range Selection

The range selection circuitry, depending on the position of the range switch, outputs one of two digital codes to the microprocessor thus determining which thermocouple type it will read.

4-5 Output Adjust

The output adjust circuitry receives a signal from the output adjust pot which is then fed to the input terminals of the instrument. The voltage varies from -12 mV on the Low position of the switch and 25 mV to 60 mV on the High position. (For R,S,B calibrations, the values are -4.8 mV to 10 mV and 10 mV to 24 mV respectively).

4-6 Power Supply

The power supply takes the voltage available from the battery pack and converts it to the different voltages required by the unit.

4-7 Low Battery

The low battery detect circuitry compares the battery voltage against a fixed reference voltage. If the battery voltage drops below 4.6 volts, the circuit signals the microprocessor to indicate "HELP" on the display.

4-8 Battery Pack

Four (4) type 1.2 AHR SC Size NiCad batteries are used to supply power to the unit. A replacement Battery Pack can be ordered. Specify part number A9344. A battery pack charger adapter should be used with the battery recharger in order to recharge the battery pack outside the Micromite. Specify Part Number A9381.

4-9 Operation in Indication Mode

A thermocouple signal at the input terminals is converted by the analog to digital converter into a digital number and is passed to the microprocessor. After 4 consecutive conversions upon the input terminals, the microprocessor throws switch S1 to the RJC position and the converter samples the terminal temperature and stores the value in the microprocessor. The microprocessor then converts the RJC temperature into its equivalent millivolt value based on the thermocouple calibration tables stored in memory. This equivalent millivolt value is then added to each of the 4 subsequent readings taken on the input terminals to provide the reference junction compensation. The compensated value is linearized to produce its equivalent temperature based on the calibration which is then displayed on the LCD display. If the "OFF - F - C" switch is set to "C", the program in the microprocessor converts its Fahrenheit temperature values to Centigrade and displays them.

4-10 Operation in the Calibration Mode

In the calibration mode, a millivolt source with a 50 ohm output impedance is switched across the input terminals, and the instrument will read the temperature corresponding to the millivolt value at the terminals. The output pot's span of -12 mV to 60 mV (-4.8 mV to 24 mV for R, S, B calibrations) is split in half to allow better resolution on the output adjusting potentiometer.

5-0 CALIBRATION CHECK OF MICROMITE

5-1 Equipment Necessary to Properly Calibrate Micromite

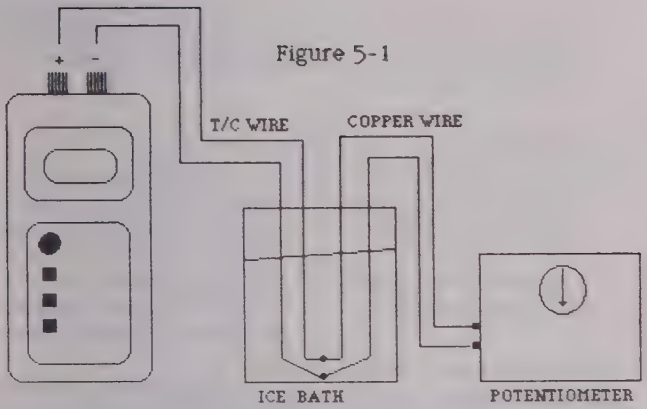
1. Precision laboratory potentiometer
2. External galvanometer (may be part of precision potentiometer)
3. Calibrated reference junction thermocouple (material leads of the same calibration as the Micromite) with copper extension leads for cold junction simulation. Thermocouple error must be known and considered for high precision measurements.
4. Thermocouple EMF vs. Temperature Conversion Table, 32°F (0°C) reference temperature.
5. 32°F (0°C) ice bath.

For precision accuracy, we recommend that Micromite calibration be checked semi-annually at 3 or 4 temperature points.

5-2 Procedure

1. Connect equipment as shown in Figure 5-1. All equipment in test setup should be thermally stable for at lease 20 minutes for greatest accuracy.
2. Select appropriate range and °F or °C scale. Be sure output is in off position.
3. Refer to the EMF vs. Temperature Table and set the precision potentiometer to the millivolt values corresponding to different temperature points throughout the span of the Micromite observing the temperature indication for each point.
4. Compare the observed readings to the actual temperature indications expected. The error should be within the accuracy of the Micromite.
5. Should accuracy be outside stated limits, contact your local Thermo Electric repair facility. (Be sure to take into account any thermocouple wire errors).

Figure 5-1



6-0 Maintenance and Parts Replacement

Repairing and replacing of parts should be done only by a person who is technically qualified. Calibration or repair of the instrument by other than Thermo Electric or an authorized service location will void the warranty. Blue print schematics and spare parts are available upon request. Contact our Instrument Service Manager for assistance.

7-0 ELECTRONIC ICE REFERENCE OPERATION
(Thermocouple Junction Compensation Module)

7-1 General Description
Typical uses of this device with a millivolt type Micromite would be to read direct temperature compensated millivolts directly from the Micromite or to output compensated millivolts from the Micromite. Standard reference compensation temperature is 32° Fahrenheit, or 0° Celsius.

For user convenience, a light-emitting diode is used to indicate battery condition. A brightly lit LED indicates a good battery. No illumination of the LED indicates a weak or dead battery, which should be replaced with equivalent AAA batteries.

7-2 Specifications

Reference Temperature Setting: 0° C

Compensation Accuracy:	+/- 1/4°C @ 25°C ambient setting
- Base Metal Thermocouples (J,K,T, &E Calibrations)	+/-1/2°C from 15°C to 35°C ambient
	+/-3/4°C from 10°C to 50°C ambient
- Noble Metal Thermocouples (R, S, thermocouples)	+/-1/2°C @ 25°C ambient setting
	+/-1.5°C from 15°C to 35°C ambient
	+/-3.0°C from 10°C to 50°C ambient

Output Impedance: Less than 100 ohms
Storeage Temperature: -20°C to 60° C with battery
Note: If battery has been subjected to temperature colder than 0°C, the unit should be allowed to warm up to operating temperature range.
Operating Temperature : 10°C to 50°C
Battery: Three AAA standard batteries
Battery Life: Continuous 500 hours

7-3 Description Code

The following identification number explains the specific model of the Micromite Thermocouple Compensation Module.

31155- -0000

In between will be J,K,T, E,R, OR S corresponding to the thermocouple calibration.

7-4 Calibration Check

To check the calibration use a calibrated thermocouple, ice bath and D.C. voltmeter with microvolt resolution set up as show in Figure 7-2. Turn the unit on and allow to settle out thermally for 10 - 15 minutes. Voltmeter reading should be zero microvolts +/- 1 microvolt, allowing for any thermocouple errors.

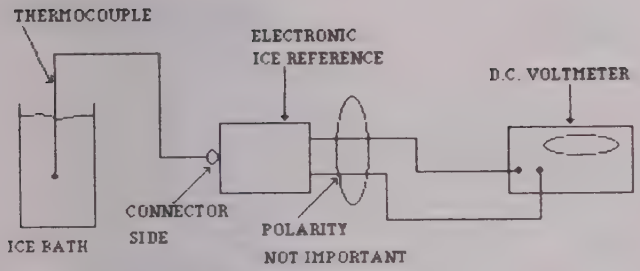


FIGURE 7-2

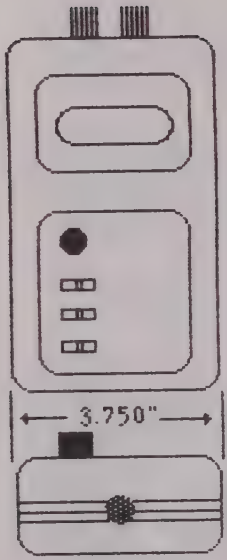
7-5 Operating Instructions

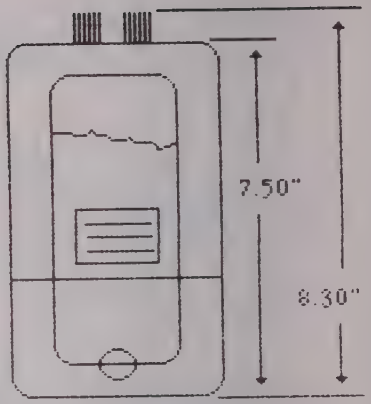
Attach the Micromite Thermocouple Junction Compensation Module so that the male banana plugs are securely inserted into the female banana jack terminals on top of the Micromite. To observe correct polarity be sure the front labels on both units face forward. Now insert the appropriate thermocouple into the female connector on the top of the module. Note the color coded label for correct ISA calibration. Turn on the Micromite and place its switches in the appropriate positions (see Section 3). Now turn on power to the compensation module by placing the three position selector switch to the "on" position. The unit is now operable. By placing Micromite in the appropriate read or output modes, the unit can read or output millivolts referenced to 32°F (0°C) and automatically compensated for ambient temperature changes.

7-6 Battery Replacement

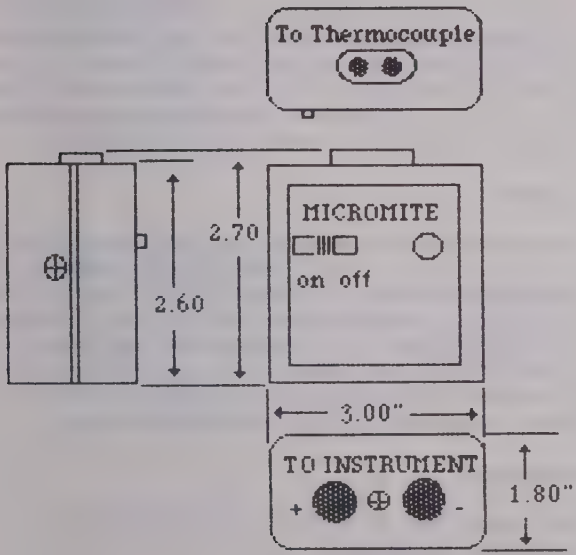
To test the battery, place the 3 position switch on the module to the Battery Test position and hold momentarily. If the LED goes on the battery is good. If the LED does not illuminate, the battery is weak or dead and should be replaced.

To replace a dead battery, remove the two screws on either side of the module, and unsnap the two halves of the case apart. Remove the battery and replace with equivalent AAA batteries. Reassemble.





Micromite Assembly Drawing



Micromite Ice Reference Module

8-0 RTD INPUT MODULE

8-1 General Description

This device is used only with a Micromite having a "P" range II. It accepts the input of 3 or 4 wire 100 ohm @ 0° C Platinum RTD's having an Alpha of 0.00385 ohms/ohm/°C, (DIN 43760 Curve). It can be used to indicate temperature only. (To output resistance based temperature equivalents see section 9). In the ouput mode the Micromite with a "P" Range II outputs a -10 to 60 mV reference signal to calibrate instruments with an accuracy of +/- 0.1 mV over the entire 70 mV span.

8-2 Operation

To use Micromite with the RTD module to read the temperature of 3 or 4 wire 100 ohm Platinum RTD's having an Alpha of 0.00385 ohms/ohm/°C, plug the RTD module into the Micromite terminals observing polarity. A slide switch on the front indicates 3 or 4 wire form. The RTD is hooked up to the binding posts of the RTD module and the RTD module is switched on. To check the battery, move the On/Off slide switch to the right. An LED will illuminate if the replaceable batteries are functional. The Micromite should be in the indicate, not calibrate mode.

8-3 Specifications

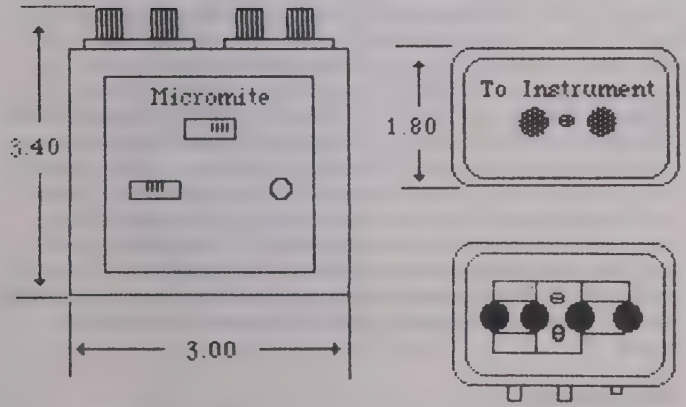
Input Circuit: Excitation circuit via precision current source
Excitation Current: 100 uA
Battery Life: 600 hours continuous
Batteries: Three AAA standard batteries
Conformity: . .2°F (.1°C)
Accuracy: +/-.7° F (+/- .4°C)
Drift: .02 deg/deg
Range: -320 to 1500°F (-195 to 815°C)
Storeage Temperature: -20 to 60°C with batteries. If battery has been subjected to temperature colder than 0°C, the unit should be allowed to warm up to operating range.
Operating Temperature: 0°C to 55° C

8-4 Description Code

The order code of the Micromite RTD Input Module is: 311560000

8-5 Battery Replacement

To change or replace a dead battery, remove the RTD module from the Micromite. Remove the 2 screws on either side of the unit and unsnap the 2 halves of the case apart. Remove the batteries and replace with equivalent AAA types. Reassemble.



Micromite RTD
Input Module

9-0 RTD OUTPUT MODULE

9-1 General Description

The RTD output module is used in conjunction with Micromite having a "P" range , and the RTD input module. It is used to simulate the resistance signal of RTD's to calibrate RTD input instrumentation.

9-2 Operation

To simulate the resistance signal of 3 or 4 wire 100 ohm @ 0° C platinum RTD's to DIN Curve 43760 (Alpha of 0.00385 ohms/ohm/°C), utilize the following procedure. Plug the RTD input module into the Micromite input terminals observing polarity. A slide switch on the front of the input module indicates 3 or 4 wire operation and should be positioned to the proper lead wire form. Position the range switch of the Micromite to the "P" range II. Be sure the Micromite is in the indicate **NOT** output mode. Plug the RTD output module into the RTD input module. Place the RTD input module to the ON position. Hook up the instrument to be calibrated leads in either the 3 or 4 wire form. Position the rocker switch on the RTD output module in the to Micromite position. Using the coarse and fine potentiometers on the RTD output module dial the temperature resistance equivalent you wish to output on Micromites display. Depress the rocker switch on the output module in the To Instrument position. At this point Micromites display will indicate "Hi", and the resistance signal will be transmitted to the instrument being calibrated. To check the temperature signal reposition the rocker switch to the To Micromite position. The temperature being output will appear on Micromite's display.

9-3 Description Code

The order code of the Micromite RTD output module is: E1373

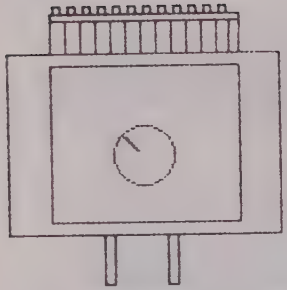
10-0 SIX AND TWELVE POSITION SWITCH MODULES

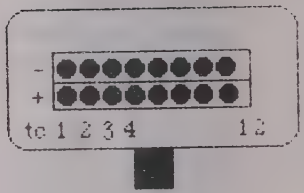
10-1 General Description

Six and twelve position switch modules are available which allow the operator to simultaneously wire multiple thermocouples or millivolt signals to Micromite.

10-2 Operation

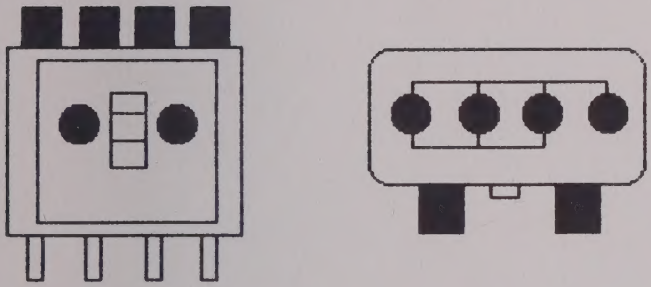
Plug either the 6 or 12 position switch module into the Micromite terminals. Make sure the label and rotary switch face the front. Hook up the thermocouple or millivolt signal leads to the top of the module, being careful to observe polarity. Point selection is made via the front set rotary switch on the module. Should the rotary switch be placed in a position where no leads are attached, Micromite will read "HI". The switch modules can be used to indicate or output for calibration.





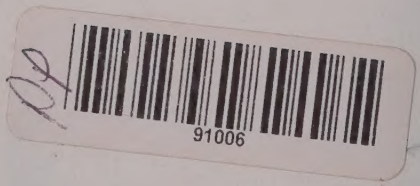
Micromite

Switch Module



RTD Output Module

Notes:



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